

Review₂: Final Exam

Name: _____

1. A student burns 61.94 g of phosphorus in a crucible exposed to the air. Afterwards the resulting power is massed and found to be 141.94 g. The molecular mass of the compound that was formed is 283.87 g/mole. Find the empirical formula and the molecular formula for the compound.

a) What is the empirical formula?

61.94 g of P

80.00 g of O added

Emp. Form = P_2O_5

b) What is the molecular formula?

Molec. Form = P_4O_{10}

2. A student measures out 1.0 moles of nitrogen gas and finds that it occupies a volume of 22.4 L when the temperature is 0°C and the pressure is 760 mm Hg.

a. What is the density of nitrogen gas at STP? (Give your answer in g/mL)

0.0012 g/mL

b. What volume will the nitrogen gas occupy if it is heated to a temperature of 345 K and exposed to a pressure of 1.4 atm?

Vol = 20.2 L

	P	T	V	n
Initial	1 atm	273 K	22.4 L	1 mol
Final	1.4	345	V?	1 mol
Effect				

c. What is the density of the nitrogen gas at the new temp and pressure?

0.0014 g/mL

3. Suppose in the Icy Hot lab that the burner transfers 450 kJ of energy to 625 g of liquid water at 20.°C while converting that water to steam.

Energy constants (H₂O)

334 J/g Heat of fusion (melting or freezing) H_f

$$Q = m C (T_f - T_i)$$

2260 J/g Heat of vaporization (evaporating or condensing) H_v

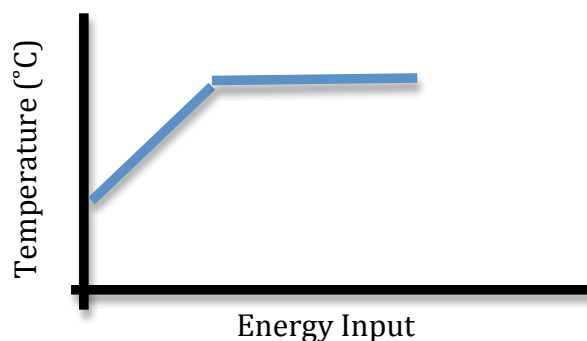
31.3 J/g°C Heat capacity (c) of water vapor

$$Q = m H$$

2.1 J/g°C Heat capacity (c) of solid water

4.18 J/g°C Heat capacity (c) of liquid water

- a. Sketch in the heating curve of water, and label the beginning and ending points of the problem.



- b. What mass of the water would be boiled away?

Energy to heat up water = 209 kJ
Energy left to evap water = 241 kJ
Water evaporated = 106 g

4. Answer each of the following by making the correct conversions.

- a. How many atoms of chromium do you have if you have 104 g of chromium metal?

1.2×10^{24} atoms of Cr

- b. If you have 9.03×10^{24} molecules of ammonia (NH₃), how many grams of ammonia do you have?

255 g of ammonia

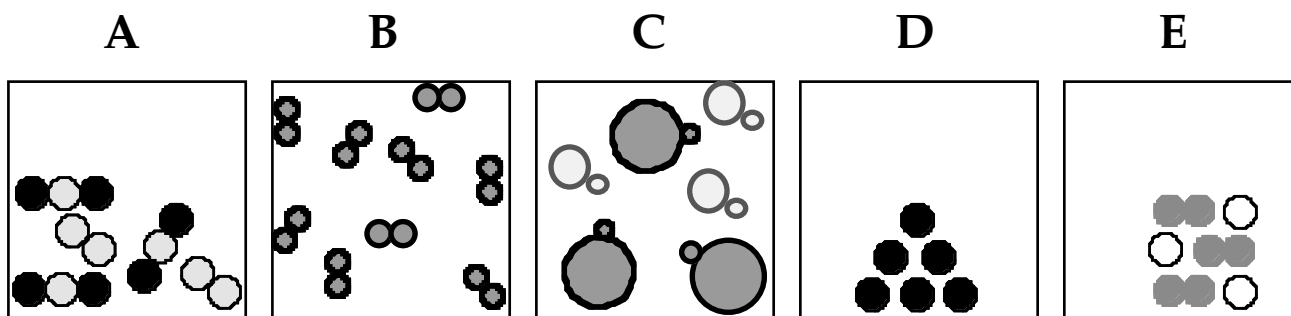
- c. Using electricity, 4.0 moles of iron (III) oxide are decomposed into its elements. How many molecules of oxygen gas will be obtained?

Iron (III) oxide = Fe₂O₃
Create 12 moles of O
Turn into 6 moles of O₂

4. Write proper names for each formula. Write proper formulas for each name.

Formula	Name		Name	Formula
H ₂ O	Dihydrogen monoxide		Mercury (II) sulfite	HgSO₃
Cu(ClO ₃) ₂	Copper (II) chlorate		Sulfurous acid	H₂SO₃
NO ₃	Nitrogen trioxide		Oxygen dichloride	OCl₂
IF ₇	Iodine heptafluoride		Ammonium nitride	(NH₄)₃N
H ₃ PO ₄	Phosphoric acid		Hexaboron monosilicide	B₆Si
Li ₂ S	Lithium sulfide		lead (IV) phosphate	Pb₃(PO₄)₃

5. Describe each of the boxes below using the terms ATOMS, MOLECULES, ELEMENT, MIXTURE, PURE SUBSTANCE, SOLID, LIQUID, GAS.



A. Mixture of molecules, mixture of elements and compounds, liquid

B. Pure gaseous element

C. Mixture of molecules, all are compounds, gas

D. Pure solid element

E. Mixture of molecules and atoms, mixture of elements, solid